A non-kinky slinky antenna – with a 1:1 balun

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Allan VK2VEC and I decided to make a couple of slinky antennas that were portable, and so the spring-like arms did not flop around and tangle in storage. After construction, the antenna plus balun ended up weighing 665 grams.

We thought it might be helpful for other hams to have these notes. The antenna is a great portable, compact dipole. It is particularly useful for operating from restricted spaces like balconies, or inside a room.

Here are our construction notes.

Making the 1:1 balun

1 Fold 1.2 metres of No14 AWG enamelled copper wire in half, and wind the folded wire for ten turns on a T130-6 toroid. Leave 60 mm of wire free of the toroid on each of the wire ends. Separate the 10 turns from each other so that they are equidistant from each other. Ensure the wire is tightly wound against the toroid.

2 Make the folded end of the wire face in one direction, and the open end (two wires) 180 degrees from the folded end.

3 Cut the wire at the fold. Scrape some enamel off about 10 mm of each of the four wire ends and tin. Refer Photo 1.

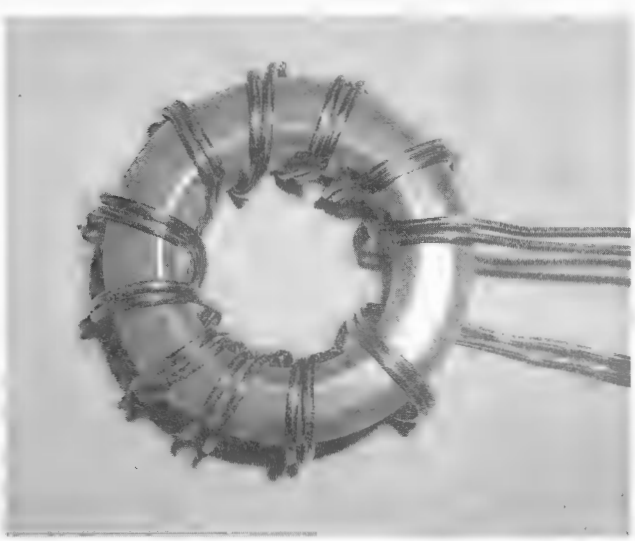

Photo 1: The completed balun.

4 At one of the box ends, drill a guide hole at about 15 mm above the box base, and centred left to right. Using this guide hole, drill or nibble a hole of about 16 mm diameter, with the guide hole at the centre.

5 Use the SO-239 socket

6 Push the SO-239 socket from the inside of the hole, and drill four holes for the panel bolts.

7 Fit the completed toroid into the jiffy box, fit the panel mount SO-239 and fit the panel bolts and screw on the retaining nuts.

8 Solder one wire to the centre of the SO-239. Twist the other wire from the same end of the toroid under one of the panel bolt nuts. You could solder this point, but be careful not to apply too much heat continuously otherwise you will melt the box. Alternatively, solder an eye tag on to the lead and thread onto the bolt before tightening the nut.

9 Make two small holes in the end opposite the side to the socket, sufficient to poke the two remaining wires through. These will be soldered directly to the slinky, so make the holes 15 mm apart. These holes will also be used to thread a cable tie through for strain relief, so make it sufficiently large, say 2 mm diameter.

10 Poke the wires through the hole, and if you have some spaghetti for insulation, sheath the wires, leaving enough free to solder to the slinky. Screw the box lid on but so you can remove it easily later to fit the strain relief cable tie.

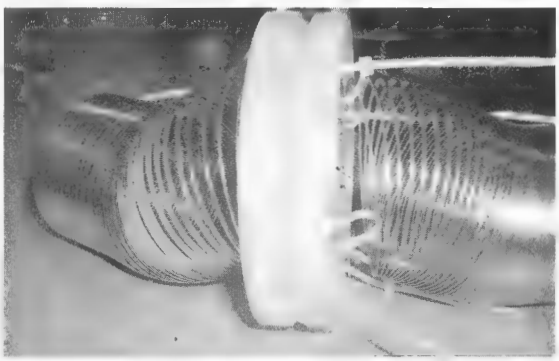

Photo 2: Attaching the slinkys to the lids using cable ties.

Making the antenna

1 Put the two plastic container screw lids back to back,

2 You need to make eight holes around the inside of the lid, such that when you place the slinky in, each of two holes allow a cable tie to hold both slinkies in place in the lid. Our lids had a convenient circle in the plastic which matched the slinky circumference, so we could drill the cable tie holes first, four on one side of the circle, and four on the other. We used a bit of double sided sticky foam tape to hold the lids together so they didn't wander whilst drilling.

3 Grind or file one end of each slinky to permit solder to stick.

4 Feed the free wires of the balun to reach each slinky when attached.

5 Scrape the enamel off the free end of the balun wires.

6 Solder the free balun wire ends each to one slinky.

7 Attach both slinkys to the lids using the cable ties, but do not tighten the cable ties completely. Refer Photo 2.

8 Thread a cable tie through the wire holes in the balun's jiffy box and in between the two plastic screw lids, and around the cable tie in between the two wires attached to the slinkys.
9 Thread a cable tie through one of the other cable ties in between the lids, so that it forms a loop on top from which to hang the slinky on a mast or tree branch with rope or extra cord.
10 Tighten the slinky cable ties and snip off the excess plastic.
11 Using an Utilux crimp tool, crimp two 6.5 mm Utilux terminal eyes to the free ends of the two slinkies. This will be useful to tie up each slinky to the extended length you choose when operating.
12 Drill a hole sufficient to allow the twine or cord through the dead centre of the lids, and thread the 15 metres of cord through the hole.
Leave 7.5 metres per side and tie a knot on either side of the hole to fix it in place. Refer Photo 3.
13 In use, the cord should be tied off to the eye of each slinky to prevent the slinky being stretched more than about 2.3 metres either side, and to support the slinky when in the air.
14 We put a few drops of glue on the balun windings to ensure they remained in place.
15 To store, roll up the cord on each side and place within each slinky, and then screw the lids on. Refer Photo 4.

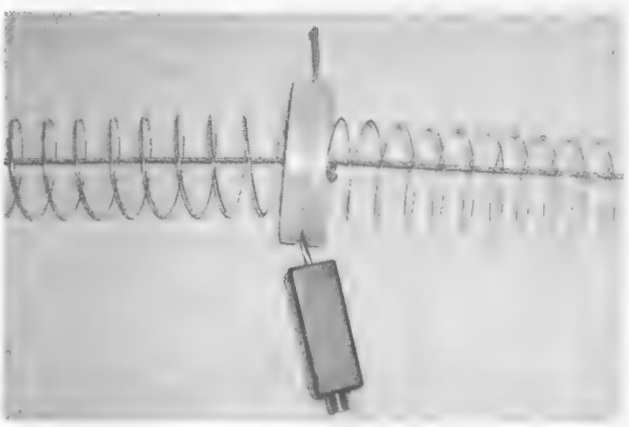

Photo 3: Fixing the cord each side of the lids.

Operating the antenna

Hang the slinky antenna from a mast, tree branch, or hook. Fit a coax feed line to the balun and the (antenna tuner and) radio. Extend each side of the antenna no more than about 2.3 metres. Tie that length to the eye at each slinky end with a knot, and use the remainder of the cord to tie the antenna to side supports. This prevents the slinky from being deformed by being stretched too much.

At about 2 – 2.3 metres, it should resonate on 40 metres. I (Raffy VK2RF) actually use an antenna tuner because when tuned, it will also radiate nicely on 20 metres, 15 metres and 10 metres.

I've also used it on 3.5 MHz with a tuner but I can't imagine it's very efficient.

Electrically the antenna is about 40.226 metres, but there are capacitance effects because of the slinky coils.

Beware

Do NOT stretch the slinky past about 5 metres. It does not work better and you will deform it.

Do NOT leave it outside for a more than a few weeks. It will rust. If you must use it outside for long, paint it to protect it, and put some silicon sealer on the holes in the jiffy box.

Further information about slinky antenna's http://www.qsl.net/kd4cga/slinky.htm

Tools used

Drill – small drill bits; knife; file; soldering iron and solder; thin heat shrink tubing; tape measure; small screwdriver; 16 mm hole drill bit (or nibble tool or reamer); Utilux crimp tool; needle nose pliers.

Total cost will be something around $35, and less if a well stocked junkbox is available.

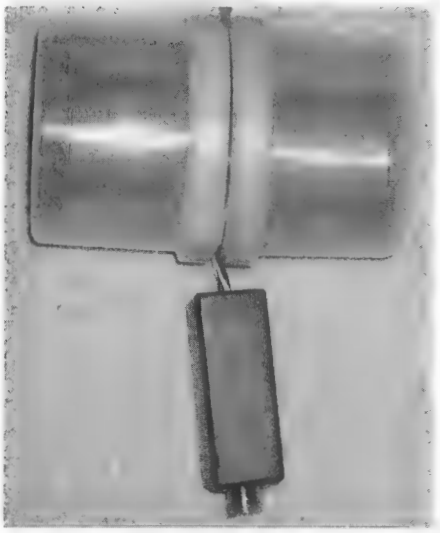

Photo 4: Storage of the cord with the slinkys, inside their plastic container.

Components

Metal slinky, 88 turns – 2 of	Toys Online Australia
450 ml round plastic screw-top container – 2 of	
14 AWG copper wire – about one metre	
Nylon cord – 15 metres – 10 of	Bunnings
Cable ties – 7 of	Dick Smith No H1980
Utilux automotive crimp eye terminal, inner diameter 6 mm, 10 pack – 2 of	Dick Smith No H3214
Torroid 130-6, in a three pack – 1 of	*http://www.kitsandparts.com/*
Jiffy box – 1 of	Jaycar HB6015 *http://www.jaycar.com.au*
Panel mount SO-239	Jaycar PS0686